Research Problem Review 76-7

DEVELOPMENT OF AN EVALUATION MODEL AND TRAINING PROGRAM FOR THE MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES): PHASE I

U. S. Army

Research Institute for the Behavioral and Social Sciences

October 1976

U. S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

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Army Project Number
2Q763731A773

Combat Training Techniques

Research Problem Review 76-7

DEVELOPMENT OF AN EVALUATION MODEL AND TRAINING PROGRAM FOR THE MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES): PHASE I

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14 ARI-RES PROBLEM REV-76-7

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FOREWORD

The research reported here is part of a broader program on unit training and unit performance assessment being conducted by the Unit Training and Evaluation Systems Technical Area of the Army Research Institute for the Behavioral and Social Sciences (ARI). Since 1972 ARI has conducted research on the development and evaluation of new training techniques, particularly crew training and tactical training in the unit context. The Army Training and Doctrine Command (TRADOC) has identified small unit tactical engagement simulation training as its highest behavioral science research priority. In 1973 ARI first demonstrated the tactical engagement simulation training method known as REALTRAIN, which provides extremely motivating, realistic training for small combat arms units, and which is described in ARI Technical Report S-4. Simple but effective casualty assessment techniques are used in REALTRAIN to conduct engagement simulation training up to the reinforced platoon level. In order to achieve tactical realism at higher unit levels, the development of a Multiple Integrated Laser Engagement System (MILES) has been initiated to provide eye-safe lasers for simulating weapons effects; this report presents the preliminary development of an evaluation model and training program to be used with the MILES hardware to provide a complete engagement simulation system to be used in the context of the new Army Training and Evaluation Program (ARTEP).

The entire program is responsive to the requirements of RDTE Project 2Q763731A773 and TRADOC's Program Manager for Tactical Engagement Simulation Systems at Fort Eustis, Virginia (formerly of the Combat Arms Training Board at Fort Benning, Georgia).

J. E. UHLANER,
Technical Director

DEVELOPMENT OF AN EVALUATION MODEL AND TRAINING PROGRAM FOR THE MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES): PHASE I

BRIEF

Requirement:

To develop an engagement simulation training program and evaluation model designed to be used with the Multiple Integrated Laser Engagement System (MILES) hardware in Army Training and Evaluation Programs (ARTEP) for the combat arms.

Procedure:

Prior ARI research has developed the REALTRAIN method of engagement simulation, for tactical training of combat arms units as large as reinforced platoons. For tactical training at the company and battalion level, MILES will simulate direct-fire casualty-producing effects with lasers and laser detectors and will reduce the number of required exercise control personnel. To provide a complete training system, ARI is developing a training program and evaluation model to be used in conjunction with the MILES hardware. The training program and evaluation model are being designed to be used in an ARTEP context.

The emphasis of this phase was to select the general approach to be followed in designing the evaluation model. Eight candidate ARTEP models--four that evaluated all phases of a mission and four that scored only the results--were rated on 21 criteria in the categories of Data base, Validity, Implementability, and Availability by Army staff members from the Training and Doctrine Command (TRADOC), Forces Command (FORSCOM), and the Infantry and Armor Schools.

Results:

It was agreed that the Situational Dependent model should be used--which does not require precise standards of performance, provides detailed intermediate training objectives, and gives diagnostic feedback for training. The Situational Dependent evaluation model requires a minimum of eight kinds of data--number, type, and location of the forces being evaluated and of the opposing forces; time; and team coordination. Evaluation procedures analyze this data base both organizationally and chronologically. The performance of each organizational component, from squad/crew up to battalion, is considered by itself as well as in relation to the other team components in the exercise. Chronological records consider intermediate engagements as well as the final exercise outcome.

Data collection, as opposed to observer judgment, is primarily a record of events and casualties. The use of an exercise narrative and an exercise diagram holds considerable promise for recording events. Casualty record sheets permit a detailed summary for each side of casualties by type of weapon and are the basic source of data on direct fire systems.

A possible engagement simulation training approach utilizes a sequence of different training techniques and is designed to economize resources while providing tactical unit proficiency.

Utilization:

The generalized evaluation model and training program described here have been developed into a detailed, specific company-level engagement simulation training and evaluation program as part of Phase II of the research. Field trials will provide feedback and validation before the model is incorporated into TCATA's Operational Test II (OT II) for the MILES-based engagement simulation system.

DEVELOPMENT OF AN EVALUATION MODEL AND TRAINING PROGRAM FOR THE MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES): PHASE I

CONTENTS

TABLES

FIGURES

DEVELOPMENT OF AN EVALUATION MODEL AND TRAINING PROGRAM FOR THE MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES): PHASE I

INTRODUCTION

PURPOSE OF PROJECT

In recent years the Army has improved tactical collective training through engagement simulation--through the simulation of weapons signatures and weapons effects and the realistic and credible assessment of casualties. Simple, but effective, low cost casualty assessment techniques have been successfully employed in conducting engagement simulation training up to the reinforced platoon level. In order to achieve tactical realism at higher unit levels, the development of a Multiple Integrated Laser Engagement System (MILES) has been initiated to provide eye-safe lasers for simulating weapons effects. The objective of this project is to develop a training program and evaluation model for engagement simulation to be used with the MILES hardware in an Army Training and Evaluation Program (ARTEP) context.

SCOPE OF THE PROJECT

The objective of Phase I was to analyze the mission requirements of combat arms units and to develop a general engagement-simulation training and evaluation model which would meet ARTEP training and evaluation requirements. During Phase I the following four tasks were accomplished: (1) Define the scope of the engagement simulation training and evaluation model and program. (2) Review ARTEP for MILES evaluation. (3) Review MILES simulation capabilities. (4) Modify and extend the REALTRAIN engagement simulation model to meet the selected ARTEP requirements.

Phases II through V will carry the evaluation model and training program development through MILES Operational Test II (OT II). Phase II will constitute the development of a detailed company level engagement simulation training and evaluation program. Phase III will provide assistance to MASSTER[1] in detailed OT II Test Plan development to ensure incorporation of the engagement simulation evaluation model and training program into the OT II test. Phase IV will provide assistance to MASSTER during the conduct of OT II to ensure that the training program is executed as designed and the engagement simulation evaluation model is correctly employed. Phase V will involve the preparation of a report on data gathered during the entire project and will provide guidance on the adaptation of the training program and evaluation model to other tactical training applications.

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[1] MASSTER (Modern Army Selected Systems Test, Evaluation, and Review), the Army's test bed for assessing equipment, concepts and doctrine, is now TCATA (TRADOC Combined Arms Test Activity).

ENGAGEMENT SIMULATION--REALTRAIN AND MILES

The Army Research Institute for the Behavioral and Social Sciences (ARI) has developed engagement simulation as a method for improving tactical training for small combat units. Formerly, field training almost totally lacked tactical realism, and maneuver was governed by umpires and a scenario time schedule. To solve the problem of unrealistic tactical training, there was a need to develop a realistic and credible method for simulating battlefield casualties. Techniques for simulating small arms fire and indirect fire for the training of infantry units were integrated into an engagement simulation training program known as Squad Combat Operations Exercises (SCOPES). These procedures employ a 6X telescope with the M16 rifle and 3" high numbers on the helmet covers of opponents. Numbers of opponents identified when firing a blank round are relayed by controllers and the target declared out of the problem. Similar techniques were subsequently developed for armor and antiarmor weapons. Combined arms application of these techniques are collectively known as REALTRAIN. Through continued development, SCOPES and REALTRAIN exercises have been successfully conducted up to the reinforced platoon level.

In order to permit engagement simulation training at the company and battalion level and to reduce the number of controllers required, the MILES development program was initiated employing eye-safe, low-power lasers for direct-fire weapons effects simulation. The MILES program is directed by TRADOC's Engagement Simulation Program Manager. PM TRADE is responsible for the development of the laser simulation devices while ARI has responsibility for development of the training and evaluation model to permit the integration of engagement simulation into the ARTEP.

In a memorandum dated 29 October 1975 the Engagement Simulation Program Manager provided a definition of the scope for the engagement simulation evaluation model and training program required. The engagement simulation evaluation model and training program were to serve the same purpose as the current combined arms (Infantry/Armor) ARTEPs and to be concerned with company/team and battalion/task force training and evaluation during Phase I, but were to focus on training at company/team level and below during Phases II through IV, and were to address only the following missions:

- Daylight Defense
- Night Withdrawal
- Night Attack
- Daylight Attack and Exploitation

REQUIREMENTS FOR THE EVALUATION MODEL AND TRAINING PROGRAM

Present ARTEPs include minimal engagement simulation and are unclear on how the casualty assessment capabilities should be included in evaluation. As engagement simulation becomes fully integrated into the ARTEP, these casualty assessments provide a far more objective means of evaluation.

Evaluation Model. The evaluation model selected will fit within the current ARTEP. The test vehicle will be an ARTEP scenario for a combined arms (infantry/armor) company/team in the four specified missions. The evaluation model will also include data collection procedures to gather objective data on casualties, obtainable through engagement simulation, as well as subjective estimates of unit performance as observed during a realistic engagement simulation exercise. The collected data will be analyzed and interpreted according to a specified procedure. This procedure will include data preparation and display for interpretation. Finally, the use of evaluation guidelines within an analytical model will permit military evaluators to make necessary evaluation decisions.

Training Program. The training program for MILES and for any engagement simulation should be patterned after current Army procedures as outlined in FM 21-6, How to Prepare and Conduct Military Training. The training program will be performance-oriented and multi-echelon tactical collective training. Consideration will be given to the inclusion of tactical board games for junior leaders and reduced level field exercises to conserve resources. The approach to training will be concerned with the collective tactical environment rather than with individual tactical skill development.

ARTEP REVIEW

Copies of the current combined arms ARTEP (Infantry, 7-45, September 1975, and Armor, 17-35, August 1975) were reviewed. Review indicated that these documents tend to list what are more properly subtasks as standards and require considerable expert judgment for evaluation and training feedback. The form in which the results are to be presented is not specified and chief controllers are free to choose the method of presentation. A new combined arms ARTEP has been prepared, and concepts presented therein will be incorporated in the evaluation model and training program as appropriate. There is a possibility that the company/team level mission requirements will result in the deletion of the night withdrawal mission. Elimination of this mission would change the scope, but not the nature, of the training program.

DESCRIPTION OF MILES

All engagement simulation systems require some means of identifying casualties. In the REALTRAIN/SCOPES system telescopes and numbers are employed. MILES will employ lasers and laser detectors for this purpose. The planned system will achieve simulation of direct fire casualty producing effects by employing a low-power, eye-safe laser transmitter mounted

upon each weapon. Each target (man or vehicle) has a series of solar cell detectors which receive the laser beam as either a near miss or hit. Hits automatically activate a buzzer on the target. Deactivation of the buzzer may only be accomplished by deactivating the target's laser transmitter. The lasers are pulse coded to provide different weapons' effects, i.e., rifles may "kill" riflemen but not tanks, but tanks may kill tanks or riflemen. The laser transmitter will also transmit a near miss beam which will cover a broader area than the kill beam; when this beam is received a series of short beeps is activated on the buzzer, and the target is thereby informed that he is under fire.

A part of Task 4 was delineation of ancillary hardware necessary for use of MILES in training and evaluation. ARI indicated the importance for training of identifying the casualty-producing weapon during engagement simulation, and the requirement for this capability has been added to the MILES system. ARI also determined that while a computer support system to record and display ARTEP events for later analysis might be desirable, it is not essential for the present MILES operation.

SELECTION OF THE EVALUATION MODEL

ANALYSIS OF CANDIDATE ARTEP EVALUATION MODELS

In order to select the appropriate evaluation model it was necessary to analyze a range of possible evaluation approaches. The model to be selected was to maximize the use of the data available from engagement simulation consistent with the state-of-the-art in combining and interpreting this data. One of the alternatives was the current ARTEP without modification. A second alternative was the current ARTEP with only minimal changes to permit the inclusion of engagement simulation. Six additional alternative evaluation approaches were also delineated.

Description of Candidate Models. The first four candidate models (including the basic ARTEP and modified ARTEP models) are termed General ARTEP Models and involve data from all phases of the missions, while the second four models are termed Terminal Product Models and are based on final mission outcomes. The alternative models are briefly outlined below. For more detail see Table 1.

General ARTEP Models:

Current ARTEP: The current ARTEP as it now stands does not include engagement simulation for company/team and battalion/task force missions, and evaluation is based upon a subjective evaluation of performance observed.

Current ARTEP with Engagement Simulation: This model would include engagement simulation, but is still based on a subjective evaluation of performance. Engagement simulation would be included in the same fashion that SCOPES is now included in the Infantry ARTEP for rifle squad evaluation. The Training and Evaluation Outlines (T&EOs) within the ARTEP would include engagement simulation.

TABLE 1: ALTERNATIVE ARTEP CHARACTERISTICS

	GENERAL ARTEP MODELS				TERMINAL PRODUCT MODELS			
	ARTEP As Is	ARTEP/ES With Engagement Simulation at all Echelons	SIT DEP With Objective Data Elements and Situational Flexibility	*OBJBAS* ARTEP with Intermediate *Performance* Objectives	UPAM	UPAM/F	TO	TOD
GENERAL	Limited engagement simulation Evaluation based solely on expert judgment Permits a focus on process information	Similar to ARTEP in terms of expert judgment Adds realistic product information	Process information is included in evaluation Based on objective data elements	Evaluation based on exhaustive list of detailed objectives Objectives developed for both process and product information	Evaluation based on mathematical trade-offs between cost and achievements Product information is the basis for score Cost and achievement standards set by local commander	Similar to UPAM but has fixed cost and achievement standards	Evaluation based on unit objective by mission Standards explicit and based on products	Similar to TO but includes process information for diagnosis only
UNIT READINESS	Determined locally and based on evaluator judgment	Same as ARTEP	Evaluation based on analysis of objective data Determined locally and based on evaluator judgment	Determined locally and based on evaluator judgment related to a list of objectives	Determined by cost and achievement trade-offs No evaluator judgment included	Same as UPAM	Determined by unit mission performance No evaluator judgment considered	Same as TO but judgment on performance provided for diagnosis
SUBUNIT	Not directly provided as part of Bn or Co exercise	Same as ARTEP	Permits determination of subunit readiness (for each participating echelon in context of overall exercise)	Permits determination of subunit readiness (for each participating echelon in context of overall exercise)	Not directly provided as part of Bn or Co exercise	Same as UPAM	Not directly provided as part of Bn or Co exercise	Same as TO
DIAGNOSIS	Only to the degree the evaluator selects Inconsistent across evaluators Army-wide	Same as ARTEP	Training deficiencies identified consistently Deficiencies determined by expert judgment also provided	Training deficiencies related to specified objectives	Not directly provided	Same as UPAM	Not directly provided	Training deficiencies identified consistently Deficiencies determined by expert judgment also provided

Situational Dependent ARTEP (SIT DEP): This model would require modified T&EOs to collect objective data elements during all phases of a mission. The evaluation would be based on performance recorded during the ARTEP missions, not on external standards. The evaluation would be flexible to allow the employment of situational variables and would permit an analysis of the contribution of intermediate "engagement" outcomes and subunit performance to unit mission accomplishment.

Objective Based ARTEP (OBJBAS): This candidate ARTEP evaluation model would require an exhaustive list of detailed objectives developed along the lines of FM 21-6. The evaluation would be focused on meeting the standards specified in the objectives. The objectives would deal with the performance of subelements and individuals and would be developed through task analysis and mission analysis procedures (much as the reconnaissance patrol example in FM 21-6).

Terminal Performance Models:

Unit Performance Assessment Model (UPAM): In this model desired standards of performance would be set by the local commander as "minimum acceptable achievement" and "maximum acceptable cost". The cost and achievement results would be end products of an engagement exercise, e.g., casualty counts, final positions, or time required to reach an objective. The evaluation consists of comparing the results in a weighted mathematical calculation. The evaluation would be relatively objective.

Unit Performance Assessment Model/Fixed Standards (UPAM/F): This model is the same as UPAM except the standards would be set by higher headquarters.

Terminal Objectives ARTEP (TO): The terminal objective model would set standards explicitly in terms of mission accomplishment, time allowed, friendly casualties allowed, and enemy casualties required. Like other Terminal Product models, the evaluation would be objectively determined from exercise products.

Terminal Objective ARTEP with Diagnosis (TOD): The standards for this model would be the same as the previous model. The essential difference is that process information would be gathered during performance. Process information describes how a unit conducted its mission, e.g., movement techniques, troop leading procedures, or the content of tactical communications. Process information would then be utilized for training feedback (diagnosis), but would not enter into the evaluation.

ARTEP Model Analysis Procedures: As the ARTEP evaluation model to be selected for the present project would potentially have implications for future armor and infantry ARTEP development it was deemed desirable to have representatives of TRADOC and FORSCOM assist in the analysis leading to the selection of the most appropriate model. Representatives of the Armor School (USAARMS) and Infantry School (USAIS), TRADOC, and FORSCOM, were asked to rate each of the eight models on 21 evaluation criteria.

The criteria (defined in detail in Appendix A) were divided into four categories: Data base, Validity, Implementability, and Availability. The Data base criteria were related to capabilities of each ARTEP model to employ engagement simulation data, e.g., would the model employ information about the performance of each subunit for evaluation? The Validity criteria were concerned with the degree to which a model would meet the intended evaluation objective. The Implementability criteria were related to the ease of implementing the candidate model in the field. There was only one Availability criterion--when would the evaluative framework be ready for use? TRADOC, FORSCOM and Combat Arms Training Board (CATB) personnel rated each evaluative criterion as to its perceived importance in the selection of the desired evaluation model. Representatives of the schools were asked to complete the matrix shown in Figure 1, and meet with representatives of USACATB to discuss the results and select an evaluation approach from among the candidate approaches.

The criteria ask the following questions about each candidate ARTEP model (see also Appendix A):

Data base

(1) Subunit data used in evaluation (yes/no)?
Subunit data available from evaluation (yes/no)?

(2) Process data used in evaluation (yes/no)?
Process data available from evaluation (yes/no)?

(3) Cause/effect information used in evaluation (yes/no)?
Cause/effect information available from evaluation (yes/no)?

(4) Cost vs achievement information used to evaluate (yes/no)?
Cost vs achievement information available (yes/no)?

(5) Casualty assessment system present (yes/no)?

Validity

(6) Objectivity of scoring strategy (Hi/Med/Lo)?

(7) Objectivity of Product data (Hi/Med/Lo)?

(8) Standards flexible or fixed (Flexible/Fixed)?

(9) How to perform information provided (yes/no)?

(10) Clarity of passing requirement (Hi/Med/Lo)?

(11) Gamesmanship potential (Hi/Med/Lo)?

(12) Ease of interpretation (Hi/Med/Lo)?

Database*	ARTEP	ARTEP/ES	SIT.DEP.	OBJ.BAS	UPAM	UPAM/F	T.O.	T.O.D.
	Evaluative Frameworks							
(1) Subunit data used in evaluation: +/-	-							
Subunit data available from: +/-	-							
(2) Process data used in evaluation: +/-	+							
Process data available from: +/-	+							
(3) Cause/effect info. used in eval.: +/-	-							
Cause/effect info. available from: +/-	-							
(4) Cost vs. achvmt. info. used to eval.: +/-	-							
Cost vs. achvmt. info. available: +/-	-							
(5) Casualty asses. system: +/-	-							
Validity**								
(6) Objectivity of scoring strategy: Hi/Med/Lo	L							
(7) Objectivity of product data: Hi/Med/Lo	L							
(8) Standards: Flexible/fix	Fl							
(9) How to perform info. provided: +/-	+							
(10) Clarity of passing requirements: Hi/Med/Lo	L							
(11) Gamesmanship potential: Hi/Med/Lo	H							
(12) Ease of interpretation: Hi/Med/Lo	L							
Implementability								
(13) # Controllers:	1							
(14) # Evaluators:	3							
(15) Evaluator training: Hi/Med/Lo	M							
(16) Controlled aggressor environ.: +/-	+							
(17) Flexibility (terr., weather, equip., pers.): Hi/Med/Lo	M							
(18) Ease of employment: Hi/Med/Lo	H							
(19) Accep. to mil. trnr.: Hi/Med/Lo	L							
(20) Accep. to mil. eval.: Hi/Med/Lo	L							
Availability								
(21) Now/Soon/OTII-1/ OTII/OTII+	Now							

*Database = Data available from and/or used in evaluative framework.
**Validity = Extent to which framework measures training readiness, per se, and is free from significant influence from intervening variables.

Figure 1. Comparison of ARTEP alternatives

Implementability

(13) Number of controllers (estimated)?

(14) Number of evaluators (estimated)?

(15) Evaluator training required (Hi/Med/Lo)?

(16) Controlled aggressor required (yes/no)?

(17) Flexibility (terrain, weather, equipment, personnel) (Hi/Med/Lo)?

(18) Ease of employment (hi/Med/Lo)?

(19) Acceptability to military trainer (Hi/Med/Lo)?

(20) Acceptability to military evaluator (Hi/Med/Lo)?

Availability

(21) Now/Soon/OT II-1/OT II/OT II+1

Results. There was a fairly high degree of agreement on both the importance of the evaluative criteria and on the evaluation of the candidate models on each criterion. There was consensus that none of the Terminal Product Models were appropriate because of their total reliance on mission outcomes with no concern with the dynamics that occur during an exercise. It was felt that much valuable process data (both objective and subjective) would be lost. There was agreement that the current ARTEP was an inappropriate model since it did not provide a means to consider the engagement simulation results available. It was further agreed that there is a need for more detailed intermediate training objectives (ITOs) than available in current ARTEPs. Although the Objective Based Model had the potential for developing the required ITOs, it was rejected because of the potential trivial nature of some objectives, the developmental time required to produce these objectives, and a general lack of flexibility in the dynamic environment of tactical collective training and evaluation. It was agreed that the Situational Dependent ARTEP Model seemed to have the most potential for meeting the perceived requirements and should accordingly be selected. The reasons for selecting the Situational Dependent Model are the flexibility of the model to consider alternative situations, the capability to provide detailed ITOs, the requirement of employing trained military expert observations, and the diagnostic information available for training feedback.

DESCRIPTION OF THE SITUATIONAL DEPENDENT MODEL

The Situational Dependent model is intended to provide a framework for organizing evaluator judgments that makes maximum use of objective data and that is sensitive to the situation-specific nature of free play engagement simulation exercises. The model does not rely on explicit statements of performance standards to compare a team's performance to some "ideal." Rather, the evaluation is based on an analytic comparison

of how the team and elements of the team would be expected to perform (given a unique tactical situation) and their actual performance during the play of the exercise. The model would provide a perspective in which evaluators can judge the contribution to overall team performance of "process" measures, such as movement to contact, communications, or the scheme of maneuver, and "product" measures such as casualties received and inflicted in terms of the requirements of the particular exercise. The model is intended to provide the flexibility required in an engagement simulation environment without sacrificing the objectivity required for a fair and impartial evaluation. Finally, the data required for the evaluation can be interpreted for diagnostic purposes.

Data Base. The model requires the following minimum data base:

1. Number of forces available. This is meant to include the number of armored vehicles, weapons systems, infantry squads, etc. that could be used in an engagement at any point in time. (It could also include expected artillery support.)

2. Kinds of forces available. This is a detailed listing of all the elements counted in number 1 above. It would also include the current chain of command and provide a listing of key personnel still remaining in the action at a given point in time during an exercise.

3. Position/location of available forces. Eight-digit coordinate accuracy is not required. Rather the purpose of this information is to present a picture of the remaining forces at a given point in time in a way that would present information that would be helpful in evaluating the tactical potential of the team. If location is known to the extent necessary to describe the team's tactical position relative to the enemy and its objective, sufficient information would be available.

4. Number of forces available for the opposite side. This data source is necessary in order to evaluate either team. The adequacy of a team's performance can only be judged in relation to the demands made on it by the other side. This holds true whether the opposition is acting in a completely free-play environment or is being completely controlled by the evaluation team.

5. Kinds of forces available for the opposite side.

6. Position/location of available forces for the opposite side.

7. Time. In certain missions time is an important factor. It is particularly relevant in attack/delay missions. There is also a close relationship between position/location and time, which must be considered a major variable in evaluating unit performance in many cases.

8. Coordination of available forces. This is a very large and potentially ambiguous item. What is meant here is: Are the elements of the team acting as a team? This implies that the leaders know where their people are, that they have adequate communication nets established, that subordinate elements know what is expected of them, that it seems

reasonable to expect the team to be able to reorganize relatively quickly in order to continue with their mission or take on a second mission, and other similar requirements. This item will be more or less subjective depending on how much data can be supplied to the evaluation team. For example, a reasonably well qualified evaluator might be able to make a judgment on the level of coordination by observing only the tactical disposition of the team. On the other hand, his confidence (and probably the reliability) of his judgments would be greatly increased if he could be given access to internal communication nets, if he could interview key personnel and subordinates, or if he could observe or otherwise be informed of the positions of various elements of the team at given points in time.

The following types of data should also be considered, as they influence the outcome of an engagement.

1. Terrain. The effects on performance of the differences between woods, deserts, mountains, and jungles are obvious.

2. Weather. Weather may affect terrain trafficability, visibility, type of support available, and morale.

Evaluation Procedure. A general evaluation scheme is shown in Figure 2. The evaluation scheme described below would be carried out after an exercise using data collected during the exercise. The available data may be viewed from two perspectives: organizational (starting at the squad/crew level and continuing to the combined arms team level) and chronological (beginning during the planning stage and ending at the conclusion of the mission). Each level of organization should be analyzed in terms of the entire chronological stream. Additionally, each chronological event should be analyzed in terms of the entire organization. The particular strategy for meshing the two perspectives has not been completely developed as yet, nor is it critical for this discussion.

Organizational: The organizational stream was developed to reflect the fact that a team is not equal to the sum of its parts. In some cases overall team performance will appear to be superior to the performances of its component elements. In other cases, excellent performance by individual elements of the team may not result in acceptable overall team play. The model is designed to provide a framework in which the team acting as a whole can be evaluated without losing information concerning the contributions of its component elements. While the organizational stream could be easily extended to include each crew-served weapon or infantry fire team, or even each individual soldier, for purposes of company and battalion level evaluation it was considered sufficient to begin at the platoon level.

The squad/crew to company level analysis will be expanded for illustrative purposes. A combined arms team is made up of two or three platoons, each expected to perform a specific part in the company mission and to work together with the other platoon(s) as a team. Each individual platoon, squad/crew can be evaluated on its performance during the mission from the planning stages (to include within-platoon SOP and troop leading procedures) through movement, to its performance during individual "engagements" after contact is made.

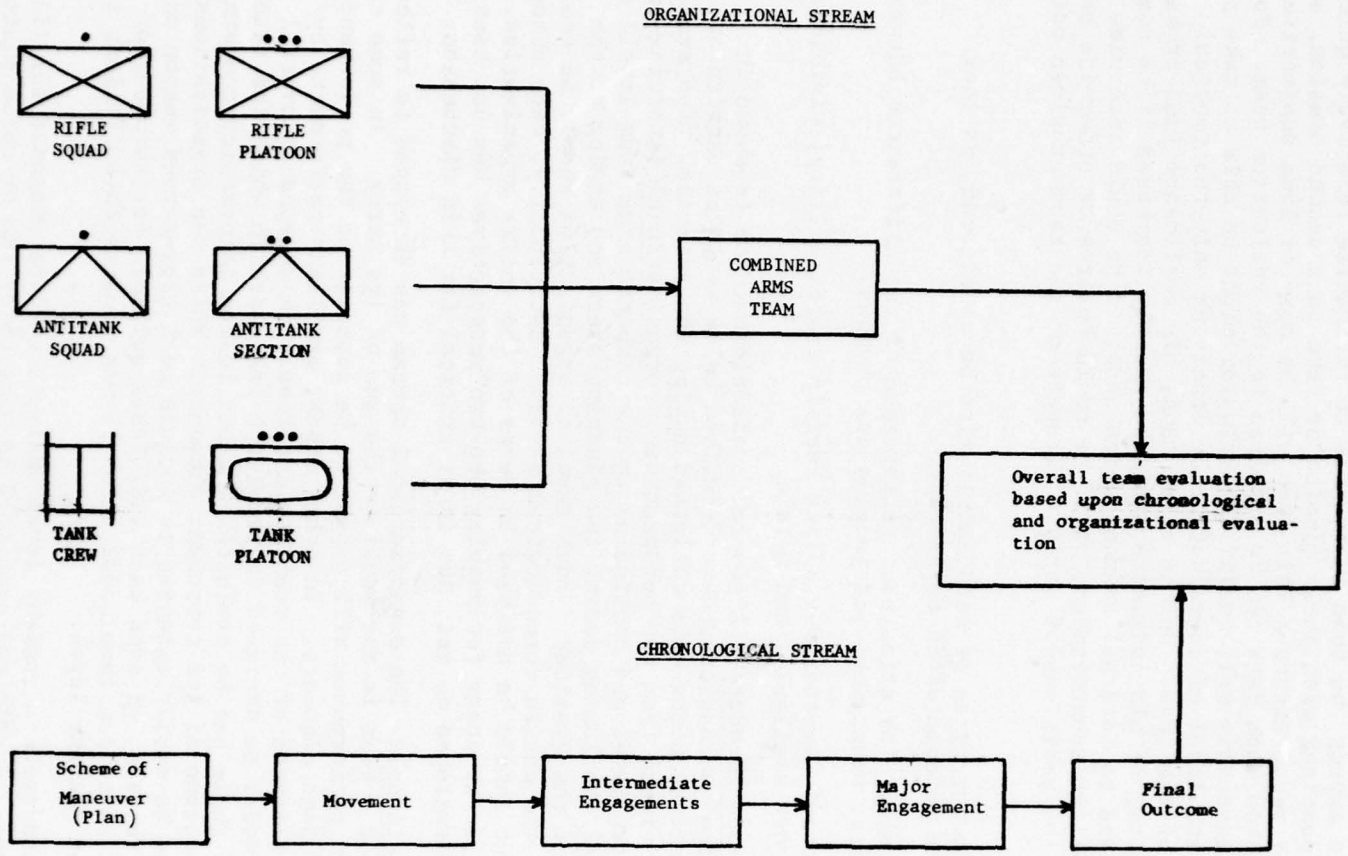


Figure 2. General evaluation scheme

For any given point in time during an exercise (for example, immediately prior to a given component unit "engagement"), the data base would provide information on the evaluated unit's disposition and that of the enemy. Given the situation portrayed at this point, evaluators should be able to "predict" what should have happend. "Predicted" performance could then be analyzed with respect to actual performance. The resulting determination of the factor(s) actually influencing "engagement" outcome would be of value for both evaluation and diagnosis.

It is hoped that this sort of analytical scheme will flag unexpected and situation-specific events. For example, a tank company may be moving forward within its boundaries, employing overwatch procedures and using terrain, but be attacked from its flanks and suffer heavy casualties. In this case, each platoon may have been doing its job in isolation, but overall the company was not effective. The lack of effectiveness may have been a function of insufficient care on the part of the company commander in insuring surveillance of his flanks or it may have been at least partly a function of another company not completing its mission. The specific cause of the casualties is less important than identifying the casualties as situation-specific. The underlying concept is that insufficient information for evaluation is available at the end of an exercise from total casualty counts or similar "product" measures in isolation. The model provides a method for incorporating the play of the exercise itself and the special characteristics of free-play engagement simulation exercises into the evaluation; it does not require standards against which unit performance is evaluated.

Chronological: The chronological perspective must be included in the evaluation model to explicitly recognize that events cannot be isolated in time, but that they must be viewed in the context of what events preceded or followed them during the exercise. For example, a platoon that moves well should not be overly penalized because a previously prepared scheme of maneuver was not adequate. Each stage at the chronological stream is discussed below.

Before the team begins to execute its mission it is necessary to know how the leaders expect their elements to perform and how the subordinate elements expect to be used. Data on number and kinds of forces available are required as a baseline which will be used in determining achievements of the evaluated unit relative to the "costs" incurred by the unit. At this point the position/location data will be in the form of a plan or conceptual scheme of maneuver. The required coordination data will be reflected in the plans for maneuver, the established SOP for chain of command, the plans for meeting unexpected developments, the understanding of what is required at subordinate levels, and other similar command and control requirements that should be completed prior to the start of the exercise.

The primary reason for observing the team during its movement is to see if the team is following the projected scheme of maneuver. In other words, it is necessary to determine if the orders, the scheme of maneuver, and the initial concept of the operation has filtered down to the people who actually have to implement it. What the team plans to do is available from the data gathered on operational plans. The question now is, were the plans translated to reality?

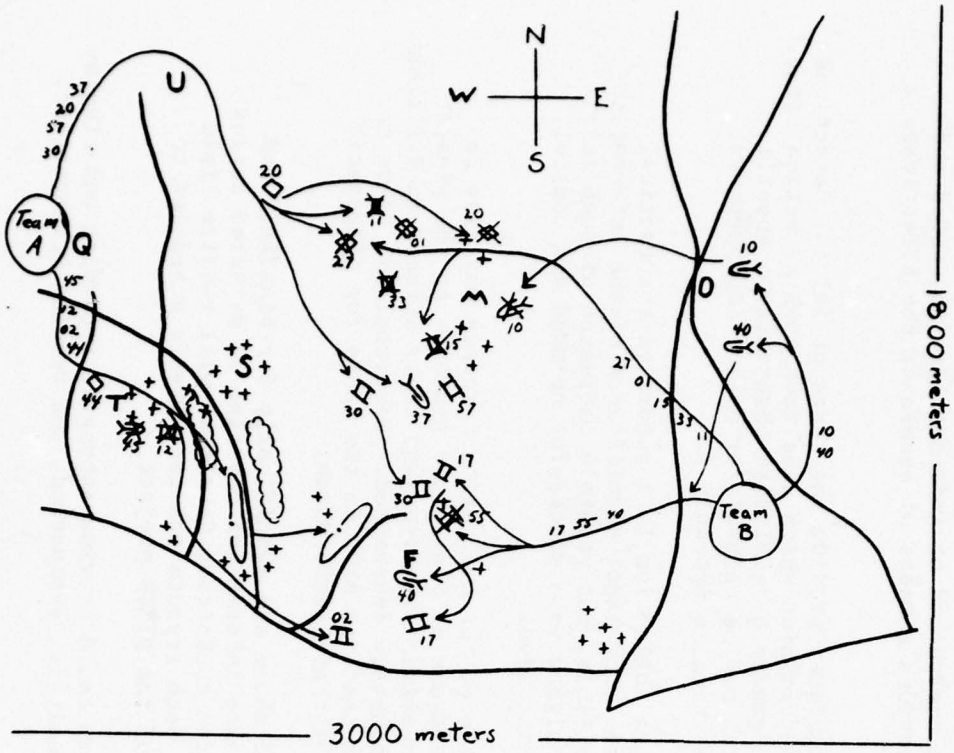
Some way of deciding when to observe performance between the line of departure and the declared end of the exercise is required. One way to determine "when to observe" is to tie observations to actual engagements. In other words, at a minimum, observe a chronological slice of the exercise every time an intermediate engagement occurs. At each intermediate engagement it is possible to determine the status of the team. Another way of looking at this might be to think of the overall exercise as a series of separate but interrelated exercises, each defined by an intermediate engagement. The outcome of each intermediate engagement could be evaluated in terms of the initial plan, the conduct of the exercise, the losses involved and the casualties inflicted, and the ability of the team to continue its mission. Clearly, the number of intermediate engagements observed will vary from exercise to exercise, but this should not cause any particular evaluation problems. In fact, the number of such engagements might turn out to be an interesting variable in itself. For example, it may be that successful teams tend to limit the number of intermediate engagements through cover and concealment and thereby keep all of their forces intact and ready for their major mission. Less successful teams might lose much of their capability to continue through a series of relatively minor engagements and perform rather poorly in trying to reach their overall objective.

The final phase is performance in accomplishment of the major mission once the main opposing force is encountered. The sort of data collected for evaluation of the team's performance during intermediate engagements will be necessary for evaluating its performance in accomplishing the major mission.

The evaluation model described here recognizes that, at present, subjective judgment must play an important part in the evaluation of company or battalion level performance. The model was designed in an attempt to formalize the subjective judgments in a manner that incorporates the maximum amount of objective information available and that explicitly recognizes the dynamic nature of two-sided engagement simulation exercises.

TECHNIQUES OF ENGAGEMENT SIMULATION DATA COLLECTION

Techniques of data collection for engagement simulation are presently being developed and evaluated. As a part of USAREUR/REALTRAIN Implementation (between November 1975 and March 1976), an ARI data collection team tried out specific techniques of data collection. One data collection technique that seems to hold considerable promise is the exercise narrative and exercise diagram. Figure 3 shows an example of an exercise diagram (exercise 233). An example of an exercise narrative for this same exercise is provided in Appendix B.



LEGEND FOR EXERCISE DIAGRAM

Assembly Area

45 37 REALTRAIN Vehicle Numbers

Route of Movement

Squad Position

M60A1 Tank

M113A1 Personnel Carrier

TOW

Vehicle Destroyed

Artillery Concentrations

Smoke

F S Map Checkpoints

Roads

Figure 3. Sample exercise diagram

The basic form for gathering casualty information is the casualty record sheet shown for Exercise 233 in Figure 4. The information in this form allows a detailed summary of casualties by type of weapon for each side which is summarized for this same exercise in Figure 5. These forms constitute the basic source of objective data on direct fire systems.

Another form of information that may be easily gathered by appropriately trained controllers is the record of indirect fire requested and its effects. This record provides a means of assessing the effectiveness of indirect fire systems.

Other data gathering techniques provide the range of initial detections and engagements as well as determining which side took such an action first. There are also subjective judgments by qualified observers on specific portions of the exercise which may be helpful for evaluation purposes. An example of such a form is shown in Appendix C.

An innovative form of data collection is a record of the tactical radio net during the exercise. The exact significance of the information thus gathered is not yet available, but possible inclusion of such information may provide useful insights into successful command and control procedures at the tactical unit level.

Much of the data now gathered for evaluation purposes may also be considered for a training feedback or diagnostic system. At the present time relationships between specific practices and their effects in different situations have not been adequately determined. Nevertheless, there is a wealth of performance data that may provide the basis for diagnostic feedback to tactical units on their performance.

The procedures described above are specifically for REALTRAIN and not MILES, but much of the same information may also be gathered during MILES exercises. The specific techniques developed will require field tryouts before final test. Such tryouts are tentatively scheduled to take place during Phase II of the MILES project.

A computer support system could provide automatic recording and display of ARTEP events for later analysis, evaluation, and results presentation.

THE ENGAGEMENT SIMULATION TRAINING PROGRAM

The present Army approach to collective tactical training is to employ the ARTEP as the basis for training objectives and then to tailor a specific program to reach these objectives in a local unit. The local unit is guided by the "How to Fight" series of manuals and by Field Manual 21-6, How to Prepare and Conduct Military Training.

NET CONTROL SHEET

EXERCISE NR. 233 DATE 18 December 1975 TIME START 0925
TIME END 1111

TYPE: Combined Arms

MISSION: Meeting Engagement

~~OFFENSE~~/TEAM A ID NR. ~~DEFENSE~~/TEAM B ID NR.

VEHICLE		PERSONNEL	VEHICLE		PERSONNEL
TANK	30	39 50	TANK	17	63 81
TANK	02	23 37	TANK	15	18 96
TANK	12	65 88	TANK	11	82 99
~~TANK~~	~~41~~	~~56 55~~ OUT	TANK	33	49 97
TANK	57	33 40	TANK	55	46 95
TOW	37	52 77 86 91	TOW	10	27 34 62 74
TOW	45	05 20 36 42	TOW	40	08 12 67 71
APC	20	02 06 14 16 21 25 35 38 43 53 54 58	APC	01	03 09 19 29 39 48 68 69 80 90 70 98
APC	49	10 24 31 55 61 64 66 73 76 79 84 94	APC	27	07 17 20 26 30 44 51 59 60 72 83 93
FO 90					

25 Inf. Plt Sgt.
50 Tk Plt Ldr 84 Sr Sq Ldr

37 Tk Plt Sgt 36 TOW Sec Ldr

81 Tk Plt Ldr 04 Inf. Plt Sgt.
03 Sr Sq Ldr

96 Tk Plt Sgt 34 TOW Sec Ldr

RECORD OF EVENTS

TGT #	TEAM A	TEAM B	FIRER	TIME	CONF	ENG DIST	CAUSE	CODE
Tk 15		X	Tk 57	0952	✓		15 in open coming down hill/spotted by inf, called in Fire	
APC 01		X	TOW 37	0959	✓		01 in open	
Tk 33		X	TOW 45	1002	—		33 moving up/down in same spot	
73	X		ARTY	1002	✓		Observed general direction	
TOW 45	X		ARTY	1006	✓		" " "	
APC 27		X	90mm 53	1008	✓		positioned in woods/waited for 27 to come down rd.	
APC 01	DGAD		LAW 27	1015	✓			
Tk 12	X		TOW 10	1019	✓		12 in open	

Figure 4. Sample casualty record sheet

NET CONTROL SHEET (CONT.)

EXERCISE NR. 233 DATE 18 December 1975

RECORD OF EVENTS

TGT #	TEAM A	TEAM B	FIRER	TIME	CONF	ENG DIST	CAUSE	CODE
TK 55		X	Arty	1020	✓			
98		X	Arty	1020	✓			
63		X	Arty	1026	✓			
Tk 11		X	LAW 25	1027	✓		Good inf. coordination / 2 Fire teams got tank from both sides	
Tk 11		X	LAW 25	1034	✓		No security / No inf. support / 11 ran out of road	
Tk 11		X	90mm A3	1035	✓			
APC 27	DEAD		TK 50	1039	✓			
TOW 10		X	TOW 37	1054	✓		Saw 10 trying to ground mount	
16	X		Arty	1058	✓			
38	X		Arty	1058	✓			
APC 20	X		Arty	1058	✓			
Tk 55		X	LAW 25	1103	✓		Good inf & tank coordination / Good inf. movement /	
21	X		Tk 55	1104	✓		2 Fire teams involved	
TK 55		X	90mm A3	1110	✓		} Disputed who got whom first / Gave credit	
43	X		TK 55	1110	✓		} to both	

Figure 4. (Con't) Sample casualty record sheet

233 EXERCISE NO. 18 Dec 75 DATE

	TEAM A									TEAM B							
	TANKS			TOW	APC	TOT VEH	CREW	INFY	TOT PERS.	TANKS			TOW	APC	TOT VEH	CREW	INFY	TOT PERS.
NO. ASSND.			4	2	2	8	26	25	51			5	2	2	9	30	24	54
HIT BY:	IMM.	IMM. THEN KILLED	KILLED	LOSSES						IMM.	IMM. THEN KILLED	KILLED	LOSSES					
TK MAIN GUN	X							2	2	X		1			1	4		4
TOW	X		1			1	4		4	X		1	1	1	3	9	11	20
LAW			X							2		X				3		3
DRAGON	X									X								
90MM			X								2	X		1	3	6	11	17
ARTY		X	X	1	1	2	5	1	6		X	X				1		1
M-16	X	X	X	X	X	X				X	X	X	X	X	X			
M60 MACH. GUN	X	X	X	X	X	X				X	X	X	X	X	X			
COAX MG	X	X	X	X	X	X				X	X	X	X	X	X			
GRENADE	X	X	X							X	X	X						
CLAYMORE		X	X								X	X						
MINE																		
OTHER																		
TOTAL		→	1	1	1	3	9	3	12		→	4	1	2	7	23	22	45

Figure 5. Sample summary of casualties by type of weapon

The former Army approach to tactical training provided a specific training program (the Army Training Program, or ATP) which included a list of subjects and hours to be taught coupled with a general lesson outline (Army Subject Schedule). This approach was a mobilization approach and lacked the flexibility desired by local units with varying needs. The new approach provides ample flexibility, but local units feel the need for more specific guidance than presently available.

The objective of the present project is to provide a prototype unit training program that would avoid the problems of the old system and yet would provide sufficient guidance for local units to conduct engagement simulation exercises. The program developed will also focus on performance-oriented multi-echelon tactical collective training.

The approach proposed for the unit tactical training program is a departure from the usual system of a detailed task analysis of individual performances. The unit training approach will be to identify specific individual and subunit deficiencies in the collective tactical training environment and then to improve the identified deficiencies in a meaningful tactical environment as much as possible. The approach will also attempt to consider the real resource limitations faced by small combat arms units in attempting to conduct tactical training.

A possible engagement simulation training approach which will consider a variety of training techniques is described in Figure 6. The terms used in Figure 6 are listed below, and a definition is given for each term in Appendix D.

IT: INDIVIDUAL TRAINING

ECT: EQUIPMENT-ORIENTED COLLECTIVE TRAINING

TDX: TACTICAL DRILL EXERCISE

TICX: TANK INFANTRY COORDINATION EXERCISE

TMX: TERRAIN MODEL EXERCISE

TOX: TACTICAL OPPOSITION EXERCISE

TEWT: TACTICAL EXERCISE WITHOUT TROOPS

MEWT: MANEUVER EXERCISE WITHOUT TROOPS

FOX: FIELD OPPOSITION EXERCISE

CPX: COMMAND POST EXERCISE

FTX: FIELD TRAINING EXERCISE

SOX: SKELETAL OPPOSITION EXERCISE

The sequence of techniques is designed to economize resources while leading to increased tactical unit proficiency. Table 2 shows the necessary terrain, personnel, type of training, and opposition for each technique. Although these techniques are sequential in nature, they may be applied to different echelons at the same time.

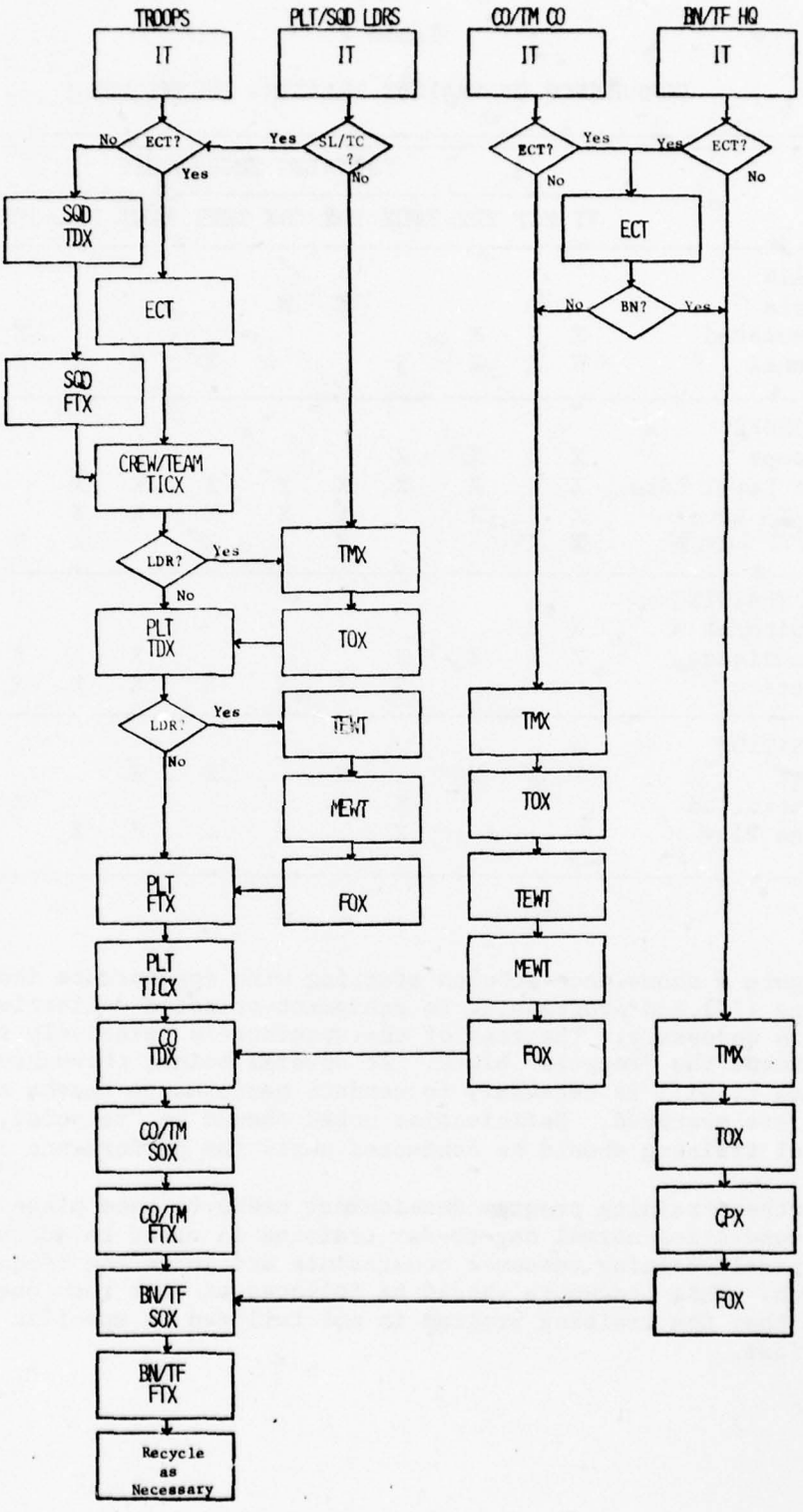


Figure 6. Multi-echelon training technique sequence

Table 2

COMPARISON OF VARIOUS TRAINING TECHNIQUES

	TRAINING TECHNIQUES											
	IT	ECT	TDX	TICX	TMX	TOX	TEWT	MEWT	FOX	CPX	FTX	SOX
TERRAIN												
Scale					X	X						
Simulated	X	X	X							X		
Actual	X	X	X	X			X	X	X	X	X	X
PERSONNEL												
Troops	X	X	X	X							X	X
Plt Level Ldrs	X	X	X	X	X	X	X	X	X		X	X
Co/Tm Level	X	X	X		X	X	X	X	X		X	X
Bn/TF Level	X	X			X		X		X	X	X	X
TYPE TRAINING												
Equipment	X	X										
Techniques	X	X	X	X				X	X	X		
Tactics				X	X	X	X	X	X	X	X	X
OPPOSITION												
None	X	X	X		X		X	X				
Controlled				X						X	X	
Free Play				X		X			X		X	X

Figure 6 shows each echelon starting with appropriate individual training (IT) and progressing to equipment-oriented collective training (ECT) as necessary. The rest of the sequence is relatively self-explanatory except the "recycle" block. At several points throughout the training sequence it will be necessary to conduct performance checks to ensure that skills are mastered. Deficiencies noted should be "recycled," i.e., remedial training should be conducted until the performance is satisfactory.

Further training program development needs to take place in active units conducting normal day-to-day training in order to adequately assess the typical training resource constraints and judge the adequacy of the approach. This procedure should be followed at more than one location to ensure that the training program is not tailored to specific local conditions.

APPENDIXES

APPENDIX A DEFINITION OF THE CRITERIA FOR EVALUATING ARTEP MODELS

The criteria ask the following questions about each evaluative framework:

Database

(1) Subunit data used in evaluation (yes/no):

Is information about the performance of each subunit used in the evaluation?

Subunit data available from evaluation (yes/no):

Is information about the performance of each subunit available from, but not necessarily used in, the evaluation?

(2)-(4) Follow the same distinction between "used in" and "available from".

Process data (2) is defined as information that describes how a unit conducted its mission.

Cause/effect information (3) is defined as data collected which indicates why a particular mission or the exercise was a success or failure.

Cost vs. achievement information (4) is defined as data which outlines the costs (dollar and non-dollar) for a given level of achievement.

(5) Casualty assessment system (yes/no):

Is a method for describing number of casualties available in the evaluative framework?

Validity

(6) Objectivity of scoring strategy (Hi/Med/Lo):

How objective are the various decisions as to mission/exercise outcomes (i.e., do evaluators make judgments on what they have seen, or, are casualty tallies, etc., tabulated and considered along specific guidelines)?

(7) Objectivity of product data (Hi/Med/Lo):

How objective is the data collected in the evaluative framework that will be used to determine mission and/or exercise outcome (i.e., does the data consist of evaluators' opinions, or, counting casualties, disabled vehicles, etc.)?

(8) Standards (Flexible/Fixed):

Are the standards for mission and/or exercise success adaptable to each situation or are they fixed?

(9) "How to perform" information provided (yes/no):

Does the evaluative framework provide information about what is considered optimum performance?

(10) Clarity of passing requirement (Hi/Med/Lo):

Is it clear to the participants in the exercise what they have to do to pass according to the evaluation standards?

(11) Gamesmanship potential (Hi/Med/Lo):

How easy is it for unit personnel to determine on what they are being evaluated so that effort is maximal for those tasks and minimal in the balance of the exercise.

(12) Ease of interpretation (Hi/Med/Lo):

Does the output of the evaluative framework provide information that is easy to understand and that is directly relatable to the needs of the user?

Implementability

(13) & (14)(# of Controllers and Evaluators:)

Requirements for support and control personnel for one side of a company/team exercise.

(15) Evaluator training (Hi/Med/Lo):

How much training and experience do the evaluators need to collect data correctly and make decisions according to guidelines in the evaluative framework?

(16) Controlled aggressor environment (yes/no):

Does the opposition have to be fixed in order to employ the evaluative framework properly?

(17) Flexibility (Hi/Med/Lo):

How easy is it to use the evaluative framework with different terrain conditions, under unusual weather situations, when unit strength varies, when quality of opposition varies, etc.?

(18) Ease of employment (Hi/Med/Lo):

Is the evaluative framework easy to use, or, does it involve complicated manuals, guidelines, etc.?

(19) Acceptability to the military trainer (Hi/Med/Lo):

Does the assessment provided by the evaluative framework (or the data collected) provide useful information to the military trainer?

(20) Acceptability to the military evaluator (Hi/Med/Lo):

Does the evaluative framework provide a straightforward and lucid statement about training and/or combat readiness?

Availability

(21) When could the evaluative framework be ready for use?

Now
Soon (6 months - 1 year)
OTII-1 (1 year - Operational Test II)
OTII (approx. Operational Test II)
OTII+ (some point after OTII)

APPENDIX B SAMPLE EXERCISE NARRATIVE

EXERCISE NO. 233 DATE: DECEMBER 1975 WEATHER CONDITIONS: Clear 25° with gusty winds

TERRAIN DESCRIPTION:

The exercise lane employed was approximately 3000 meters long and 1800 meters wide. The terrain was generally open and rolling with patches of woods and a few dominating hills. Checkpoints had been selected throughout the area and these points will be identified for a guide to the remainder of the narrative. QUEBEC was a small knoll in the northwest sector of the lane. North and slightly east of QUEBEC was UNIFORM, another knoll, while east of both knolls was a large wooded area which extended throughout the northern section of the lane. South of QUEBEC was a hill mass covered with woods and termed checkpoint TANGO. There was a north-south road that ran generally from UNIFORM south past TANGO to an east-west boundary road on the south of the exercise lane. East of the north-south road and slightly north of TANGO was a small wooded hill with almost circular contour lines, called checkpoint SIERRA. On the west side of the north-south road was the base of a wooded ridge which ran from SIERRA south to the road junction. East of the road junction was FOXTROT, the most dominant terrain feature in the exercise lane. A ridge ran north from FOXTROT to the northern woods intersecting the woodline east of SIERRA. Further east from this juncture was MIKE, a benchmark near the woodline. About 500 meters from MIKE was OSCAR, a road junction of two roads running generally north-south and constituting the eastern boundary.

TEAM A PLAN:

Team A consisted of four tanks, two TOWs and two infantry squads mounted in armored personnel carriers. The Team A assembly area was located in the vicinity of checkpoint QUEBEC. Its general mission was to attack and seize an objective in the vicinity of the road junction in the extreme southeast corner of the lane.

Team A was organized into two combined arms elements. The first, under the direction of the tank platoon leader, consisted of two tanks, a mounted infantry squad, and a TOW vehicle. The infantry platoon leader directed the second element which consisted of two tanks, a mounted infantry squad, and a TOW vehicle. The infantry platoon leader was to start at QUEBEC, move through TANGO, and continue toward the road junction southwest of FOXTROT. The tank platoon leader was to start in the vicinity of UNIFORM, move to the woodline north of MIKE, consolidate in the vicinity of MIKE, and drive on towards the objective. It was anticipated that smoke would be utilized in the movement east of the SIERRA-FOXTROT line.

TEAM B PLAN:

Team B consisted of five tanks, two TOWs, and two infantry squads mounted in armored personnel carriers. The Team B assembly area was located approximately 500 meters south of checkpoint OSCAR. Its general mission was to attack and seize an objective in the vicinity of the road junction south of checkpoint QUEBEC.

Both infantry squads, mounted in their vehicles, and followed by the tank heavy section consisting of three tanks were to move north to checkpoint OSCAR and then turn west and follow the northern boundary through checkpoints MIKE and SIERRA to the objective. The light section of two tanks was to move along the southern boundary and set up overwatch positions in the vicinity of checkpoint FOXTROT. The TOWs were to set up initially near the assembly area and follow by bounds, overwatching the movement of the rest of the team.

OUTCOME:

The outcome of this battle was a clear victory for the A Team. At the conclusion of the battle, all of the B Team vehicles and personnel were destroyed, with the exception of one tank and one TOW, whereas the A team had suffered casualties to one tank, one TOW and one infantry personnel carrier.

DISCUSSION:

Team A. The Team A plan was executed essentially as planned. The first action of the exercise was the successful engagement by a Team A tank of one of the Team B tanks sighted moving down the western slope of checkpoint MIKE. A Team B infantry personnel carrier carrying a complete squad was detected in the same vicinity and destroyed by a Team A TOW. A second Team B tank was also detected by a Team A tank in the vicinity of MIKE. Good coordination by the tank, which did not have a clear field of fire, and one of his TOWs led to the destruction of the Team B tank. The second Team B infantry squad, still mounted in their vehicle, was destroyed by dismounted Team A infantry in the vicinity of checkpoint SIERRA. The final Team B tank in the northern section of the lane was detected by the dismounted Team A infantry. Employing close coordination between two fire teams and utilizing a captured radio, the Team A infantry was able to hit this tank with two LAWs and one 90mm round, destroying it.

The action along the southern boundary began when Team A detected the Team B tanks in the vicinity of checkpoint FOXTROT. Artillery was called and adjusted, immobilizing one tank and causing several casualties to dismounted personnel. The immobilized tank was detected by a Team A tank, but it could not move into an unexposed firing position. Therefore, infantry support was requested and the Team A dismounted infantry squad in the vicinity of MIKE moved south towards FOXTROT. Coordinating with their tank, the Team A infantry was able to destroy the immobilized Team B tank with LAW and 90mm fire. In the course of this engagement two Team A infantrymen were hit by tank fire.

The Team A element which had been moving along the northern boundary continued to move in a generally easterly direction. At the end of the exercise the two tanks and one TOW had reached the ridgeline extending from MIKE to FOXTROT. During the movement the Team A TOW detected and destroyed a Team B TOW in the vicinity of MIKE. One of the Team A dismounted armored personnel carriers moved north of MIKE where it was destroyed by its own artillery which had been called to cover the eastern movement. One tank, one armored personnel carrier, and one dismounted infantry squad remained of the Team A southern element at the end of the exercise. The tank was located at the road junction southwest of FOXTROT, the dismounted infantry had taken positions in the treeline just west of FOXTROT, and the armored personnel carrier remained in the vicinity of TANGO where the infantry had dismounted.

Team B. The Team B movement to contact proceeded esentially as planned. The most important aspect of the movement was the serious mistake of keeping the infantry mounted while advancing near a woodline. The infantry remained mounted for almost 1000 meters, continuing to advance despite the loss of several vehicles to Team A fire. This led to no infantry protection for the Team B armored vehicles. Team B was only able to destroy two Team A vehicles. The first was one of the Team A TOWs, destroyed by indirect fire in the vicinity of TANGO. The second was a long range engagement by one of the Team B TOWs which detected a Team A tank on the eastern slope of TANGO. The TOW was later destroyed as it was being ground mounted at MIKE. At the end of the exercise the one remaining Team B tank and one remaining TOW were positioned in the vicinity of FOXTROT.

COMMENTS:

Team A had two and a half weeks of REALTRAIN experience prior to this exercise. In contrast, this exercise represented only the third REALTRAIN exercise for Team B. The effects of the REALTRAIN experiences are evident in the differences between the conduct of the two teams.

The success of Team A reflects the excellent coordination between the Team A elements as they detected, engaged, and informed other elements of the enemy actions, adjusted artillery and closely coordinated with each other in the thorough destruction of Team B. In contrast, elements of Team B generally failed to keep one another informed of critical events. For example, interviews with individual Team B members revealed that Tank 15, the first Team B tank loss in the exercise, had detected tanks and a TOW to its front just prior to its destruction. The gunner detected the enemy vehicles and informed his tank commander, the tank platoon sergeant. Nevertheless, the tank platoon sergeant neglected to either inform his platoon leader about the targets or engage them. Instead he continued to move as he was initially instructed to by his platoon leader. Of the two successful Team B engagements, one was a result of intervention on the part of its senior controller. After Team B had sustained its initial losses its senior controller recommended to the platoon leader that artillery be called in on reported enemy positions. This action was promptly taken by the platoon leader resulting in the destruction of a Team A TOW.

APPENDIX C SAMPLE TACTICAL DATA SUPPLEMENT

EXERCISE NR. 233 DATE 18 December 75 MISSION TEAM A TEAM B Meeting Engagement

I. INITIAL DETECTION

WHO:	TEAM A	TEAM B
	INFANTRY ____	INFANTRY ____
	TANKS X (30)	TANKS ____
	TOW ____	TOW ____
	F_O ____	F_O ____
WHAT:	TEAM B	TEAM A
	INFANTRY ____	INFANTRY ____
	TANK ____	TANK ____
	TOW X	TOW ____
	FO ____	FO ____

WHERE: 1700 Meters Apart

10 Meters W of Point FP 86

WHEN: 0935 Hours

HOW: Exhaust Signature ____ Vehicles Sighted X

Noise Signature ____ Positions Sighted ____

Troops Sighted ____

II. INITIAL ENGAGEMENT

WHO:	TEAM A	TEAM B
	INFANTRY _____	INFANTRY _____
	TANKS X (57)	TANKS _____
	TOW _____	TOW _____
	FO _____	FO _____
WHAT:	TEAM B	TEAM A
	INFANTRY _____	INFANTRY _____
	TANKS X (15)	TANKS _____
	TOW _____	TOW _____
	FO _____	FO _____

WHERE: 1300 Meters Apart

200 Meters N of Point FP86

WHEN: 0952 Hours

HOW:

Direct Fire		Indirect Fire
M16 _____	TOW ____	Observed Tgt _____
M60 _____	TANK MAIN GUN ✓	Unobserved Tgt _____

III. USE OF SMOKE TO COVER MOVEMENT

TEAM A		TEAM B	
Time	Effective Use	Time	Effective Use
1043 hr	(Y) N (USED AS DIVERSION)	0940 hr	Y (N)
____ hr	Y N	1013 hr	Y (N)
____ hr	Y N	1042 hr	Y (N)
____ hr	Y N	____ hr	Y N

IV. POINT AT WHICH INFANTRY FIRST DISMOUNTED

	TEAM A	TEAM B
	TIME: 0932 Hr	TIME: NEVER DISMOUNTED KILLED IN TRACKS Hr
LOCATION:	meters of point SOUTH HALF OF TANGO WOODS	m. of point
	or	
	At L. D.	
✓	At first danger area	
	After first detection	
	After first engage.	
	Other	
Did Infantry remount?	Y (N)	Y N
If Yes, Time	Hr	Hr

V. UTILIZATION OF TOW WEAPONS

	TEAM A		TEAM B	
	TOW # 1	TOW #2	TOW # 1	TOW # 2
	45	37	10	40
1. Positioned in single static overwatch position:	Y (N)	Y (N)	Y (N)	Y (N)
If Yes, Location:		at point		
2. Movement — Moved with Tank Element	NORTH OF Q TO T	U TO M Trail.		
	IMMEDIATELY BEHIND LEADING TANKS OR APCs	Advance		
3. Assumed Overwatch Positions:		At Point Hill 517		AREA OF FP 81
		At Point M		F
		At Point		

VI. UTILIZATION OF WEAPONS SYSTEMS TO SUPPRESS OPPOSITION

TEAM A					TEAM B				
Time	Indirect	TOW	M60	Coax	Time	Indirect	TOW	M60	Coax
1100 hrs	✓				935	✓			
1108 hrs	✓				950	✓			
____ hrs					959	✓			
					1032	✓			
					1050	✓			

VII. RECON

Did tank platoon employ recon techniques such as dismounting crew members or use of binoculars?

	TEAM A	TEAM B
Yes	X	X
No		

VIII. COMMUNICATIONS

1. What types of commo problems were experienced?

	TEAM A	TEAM B
None	X	X poor content
Between tanks		
With higher HQ		
With Arty		

2. Were alternate commo links established?

	Team A	How?	TeamB	How?
Yes				
No	X		X	

IX. OUTCOME?

1. Which team won engagement?

Team A X Team B _____

APPENDIX D DEFINITIONS OF TRAINING TECHNIQUE ABBREVIATION

INDIVIDUAL TRAINING (IT): Training conducted to prepare the individual officer, NCO or enlisted person to perform specified duties and tasks related to an assigned MOS and duty position.

EQUIPMENT-ORIENTED COLLECTIVE TRAINING (ECT): Training that prepares a group of individuals (crews, teams, squads, sections) to accomplish tasks required of the group as an entity in the employment of crew-served equipment (e.g., a tank, TOW, artillery piece, etc.).

TACTICAL DRILL EXERCISE (TDX): An exercise emphasizing small unit tactical technique or procedure conducted by the unit on available terrain (parade ground, ballfield, or actual terrain). It is used to train small units to perform tasks requiring a high degree of teamwork, such as fire and maneuver, actions at danger areas, and counter ambush techniques.

TANK INFANTRY COORDINATION EXERCISE (TICX): A crew/team or small unit tactical exercise in which a tank crew/section and small unit infantry coordination are conducted. The opposing force should emphasize tank hunter/killer teams and anti-tank mine warfare and/or anti-tank squad/section coordination. The exercise opposition may be either controlled or free-play.

TERRAIN MODEL EXERCISE (TMX): A tactical exercise in which a sand table or some other type of terrain model is substituted for actual terrain. It is used to train leaders to plan and conduct tactical operations, and to demonstrate the conduct of an operation to an entire unit.

TACTICAL OPPOSITION EXERCISE (TOX): A tactical exercise/game in which battles are simulated between two forces on a representation of the terrain (map board, terrain model, etc). It is used to train leaders to plan and execute tactical operations.

TACTICAL EXERCISE WITHOUT TROOPS (TEWT): A tactical exercise in which leaders plan the maneuver or deployment of simulated troops on a particular piece of ground followed by a discussion of the solutions.

MANEUVER EXERCISE WITHOUT TROOPS (MEWT): A tactical exercise in which leaders plan and maneuver/deploy simulated troops represented by subordinate leaders on a specific piece of ground. It is used to train leaders in the skills of command and control, land navigation, communication, coordination, maneuver, and deployment.

FIELD OPPOSITION EXERCISE (FOX): A tactical exercise/game in which battles are simulated between two forces represented by leaders and their subordinate leaders on a particular piece of ground. It is used to train leaders and their subordinates to plan and execute tactical operations in a field environment without troops.

COMMAND POST EXERCISE (CPX): An exercise in which leaders, staff officers, and communications personnel plan and execute tactical operations without troops.

FIELD TRAINING EXERCISE (FTX): An exercise in which a unit conducts training in the field under simulated combat conditions where the troops and armament of one side are actually present while those of the other side may be partially or fully represented by a second unit.

SKELETAL OPPOSITION EXERCISE (SOX): An exercise in which a unit conducts field training under simulated combat conditions where a portion of the subordinate units and the major subordinate leaders are present on two opposing sides. It is used to train leaders and selected units to plan and execute tactical operations in the field. It combines the advantages of the Field Opposition Exercise (FOX), Field Training Exercise (FTX), and Command Post Exercise (CPX).